the maximum width that can be accommodated within the bezel.

It will be noted that the four plates are mounted to extend beyond the front surface of CRT faceplate **1**. In this position, they act as antenna to pick up electromagnetic noise generated by the CRT when it is operated to form a displayed image on the faceplate. In particular, the electromagnetic noise generated by the field created by the E.H.T. supply (extremely high tension or voltage) to the CRT anode is sensed. This radiation is at a frequency equal to the ripple frequency of the EHT supply. If this supply is generated by the line flyback of the vertical timelane generator in the display unit, then, for a raster scan display system using the NTSC standard, this frequency will be 15 KHZ. If another type of RF EHT generator is used, then the frequency of that generator will be that causing the noise picked up by the plates. As will be seen later, any other noise picked by the plates can be filtered out by sensing circuits coupled to the plates, and will not, therefore, affect the operation of the system.

The object of the system is, of course, to determine the position of a finger, or any other conducting object positioned on the display area of the CRT faceplate. In the absence of such an object, the noise sensed by each plate in a pair (in plates **3** and **4** and plates **5** and **6**) is substantially equal. When a finger or other object contacts the screen, it disturbs the electromagnetic noise field and therefore changes the induced voltages on the plates. These changes are then sensed and used to generate signals indicating the position of the object relative to the four plates.

FIG. **3** shows the sensing circuits which are coupled to receive the signals induced in the plates. In this figure, lines **7** and **8**, coupled respectively from plates **3** and **4**, are applied through buffer amplifiers **30** and **31** to bandpass filters **34** and **35**. These bandpass filters have a narrow passband centered about the ripple frequency of the CRT E.H.T. supply, so that other noise picked up on plates **3** and **4** is filtered out. The bandpass filter outputs are applied as respective inputs to a differential amplifier **38**. This is arranged to provide a zero output when both plates are generating the same output signal, i.e. when no object touches faceplate **1** of the CRT. Any inherent variations in the signals on plates **3** and **4** can, of course, be corrected by adjusting the gain of one of the buffer amplifiers **30** and **31**, or the balance of differential amplifier **38**. Now, whenever an object is placed on the CRT faceplate, different amplitude signals are induced in plates **3** and **4** and appear over lines **7** and **8**. After amplification and filtering, these generate different outputs from differential amplifiers **38**, the output of this amplifier varying in accordance with the relative position of the object between plates **3** and **4**. In a similar way, either a zero output or different varying outputs are generated by a differential amplifier **39**. This receives, as its inputs, the signals from plate **5** over line **9** amplified by buffer amplifier **32** and filtered by bandpass filter **36**, and from plate **6** over line **10** amplified by buffer amplifier **30** and filtered by bandpass filter **37**. Amplifiers **32** and **33** and filters **36** and **37** are identical to the corresponding components in the plate **3** and **4** sensing circuit.

The outputs of differential amplifiers **38** and **39** are AC signals at the bandpass frequency having amplitudes representing respectively the x and y co-ordinate positions of an object, if any, touching the CRT faceplate. These outputs are applied to an analog multiplexer **40**, which is responsive to a control signal (not shown) to switch between the outputs of the differential amplifiers. The multiplexer outputs are fed to peak AC to DC converter **41**, the output of which is converted to digital signals by analog-to-digital converter **42**. Thus, digital representations of the x and y coordinates of the object are generated alternately. These are applied to a microprocessor coupled to the display unit to provide interactive position feedback.

FIG. **4** is a perspective view of a practical configuration of the sensor plate system, in which the plates are mounted in a cabinet bezel which accepts the CRT face. In detail, the bezel **50** includes a front section **51** against which the front face of a CRT locates. Integrally molded into the bezel are the four plates **3** through **6**, these being molded into an insulated support **52** into which the sides of the CRT faceplate fit. Each plate includes a connector tab, **53** through **56** respectively, for connection to the sensor circuits. These connections are made firstly by shielded wires (**57** through **60**) from each tab and, from the end of each shielded wire, by shielded twisted pairs as shown. In order to minimize the effect of ambient interfering signals, the length of each of the shielded wires **57** through **60** is made as short as possible. Thereafter, the length and routing of the shielded twisted pairs is not critical.

It is, of course, clear that the depth of the bezel may be such that the plates could be fully molded therein, with just the connection tabs exposed. Alternatively, a plate assembly, with the plates mounted on a rectangular support, could be fitted into a rectangular slot in the bezel. In another arrangement, the plates could be fitted into four separate slots in the bezel.

While the invention has been shown and disclosed with reference to particular embodiments, it will be understood by those skilled in the art that various other changes in form and detail may be made without departing from the spirit and scope of the invention.

I claim:

1. An electromagnetic touch sensor input system in a display device including a cathode ray tube having a rectangular faceplate, said system including first and second elongated conductors positioned adjacent and along respective side edges of said faceplate, third and fourth elongated conductors positioned adjacent and along upper and lower edges of said faceplate respectively, said conductors surrounding an overlay-free viewing area on said faceplate, first differential amplifier means having inputs coupled respectively to said first and second conductors, and second differential amplifier means having inputs coupled respectively to said third and fourth conductors, said amplifier means generating output signals representing differential electromagnetic noise signals induced in the respectively connected conductors by the cathode ray tube, whereby said amplifier means provide output signals indicating the coordinate location of an object touching or immediately adjacent the faceplate and differentially altering the pattern of said electromagnetic noise signals.

2. A touch sensor input system according to claim **1** in which the display device includes a front bezel arranged to locate said faceplate and define a viewable opening for the faceplate, and in which said conductors are mounted within the bezel round said faceplate.

3. A touch sensor input system according to claim **1** in which each conductor is in the form of a strip having a width extending forwardly of said faceplate.